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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/308,620	07/20/1999	KUNIHIRO TSUBOSAKI	501.37120X00	6414

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EXAMINER

THAI, LUAN C

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 10/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/308,620

Applicant(s)

TSUBOSAKI ET AL.

Examiner

Luan Thai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 August 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 13-24 is/are pending in the application.
- 4a) Of the above claim(s) 3, 10 and 15-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-6, 8, 9, 11, 13 and 14 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 1999 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 25.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Continued Prosecution Application

1. This Office Action is responsive to the last Amendment along with the request filed on 8/19/2002 for a Continued Prosecution Application (CPA).

Claims **25-32** have been canceled.

Claims **1-11 and 13-24** are pending in this application.

Claims **3, 10, and 15-24**, have been withdrawn from the consideration as being directed to non-elected invention.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation of "an air vent of the metal mold structure" in claims 6 and 8 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 4, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,460,825).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1, 4, and 11, Haghiri-Tehrani et al. (see specifically figures 4a, 5a, and 7) disclose a semiconductor device including a semiconductor chip 3 having a principal surface and a back surface, opposite to the principal surface, disposed in a device hole 15 provided in a tape carrier including a base layer 1 and a lead portion 4 bonded thereto with one end of the lead portion 4 being electrically connected to an external terminal of the chip 3, the semiconductor device being disposed in the device hole such that the principal surface thereof is facing in the same direction as the side of the base layer to which the lead portion is bonded, characterized in that the semiconductor chip 3 has a reduced thickness less than that of the tape carrier 1, and that the thin semiconductor chip 3 is sealed, covering both the principal and back surfaces, by a seal resin material to achieve a thickness at the resin sealed location of the device equal to the combined thickness of the base layer and lead portion of the tape carrier. Haghiri-Tehrani et al. fail to teach that the thickness of the semiconductor chip is defined (or polished) by spin-etching the back surface of the chip.

Although Haghiri-Tehrani et al. do not teach the thickness of the semiconductor chip being defined (or polished) by spin-etching the back surface of the chip, this

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limitation is taken to be a product by process limitation, and it is the patentability of the claimed product and not of recited process steps which must be established. Therefore, when the prior art discloses a product, which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product "gleaned" from the process steps, which must be determined in a "product by process" claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Regarding claim 2, although Haghiri-Tehrani et al.'s reference does not specifically disclose a stress neutral plane extending parallel to the principal surface of the chip at a position along the thickness direction of the tape carrier 1, this feature is taken to be inherent in Haghiri-Tehrani et al.'s device since the claimed structure is identical to Haghiri-Tehrani et al.'s device which comprises a chip being sealed by a seal resin material so that the principal surface and the back surface of the chip are covered with the seal resin material, and that the seal resin material has its upper and lower surfaces substantially identical in level to upper and lower surfaces of the tape carrier.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,460,825) in view of Miyano et al (5,811,877).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claim 14, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for electroplating being applied to the end of the lead to be coupled to the external terminal of the semiconductor chip.

Electroplating the end of a metal lead, however, is a well known technique in semiconductor art for simplifying the process of electrical connecting a metal lead to an external terminal of a semiconductor chip, as disclosed by Miyano et al (Col. 10, lines 15+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply electroplating to one end of the lead

in the proposed device of Haghiri-Tehrani et al. in order to simplify the process of electrical connecting the metal lead to the external terminal of the semiconductor chip.

6. Claims 9 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,460,825) in view of Nakamura (5,729,051 of record).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claim 9, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a bump electrode formed at the remaining end of the lead.

Nakamura while relates to a similar package design teaches a bump electrode 5 being formed at the remaining end of the lead 3 for forming an electrically interconnect between the device and a mounting board. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a gold bump as taught by Nakamura for forming electrical connection between the device and the mounting board.

Regarding claim 13, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for a gold bump electrode at the external electrode of the chip.

Nakamura while relates to a similar package design teaches a gold bump electrode form on the external terminal of the chip for making electrical

connection with the lead. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use gold bumps as taught by Nakamura to construct electrical connections between the chip external terminal and the lead in Haghiri-Tehrani et al.'s device.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,460,825) in view of Ueda et al. (5,196,917 of record).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claim 5, Haghiri-Tehrani et al. disclose all the limitations of the claimed invention as detailed above except for the tape carrier having a seal resin injection port for using in seal resin injection.

Ueda et al. while relate to a similar structure design teach that (figures 1-9) a passage 14 used in seal resin injection is formed at part of the tape carrier 1 thereby causing the device hole 3 to be coupled to a gate 17 of a metal mold structure 10 used during formation of the seal resin. It would have been obvious to one of ordinary skill in the art at the time the invention was make to apply Ueda et al.'s teachings to Haghiri-Tehrani et al.'s device in order to perform the process of encapsulating the device.

8. Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haghiri-Tehrani et al. (4,460,825) in view of Ueda et al. (5,196,917 of record) and further in view of Kamiyama et al (5,422,163).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 6 and 8, the proposed device of Haghiri-Tehrani et al. and Ueda et al. discloses all the limitations of the claimed invention (including an air exhaust port 15 or 25, 35) as detailed above except for the metal mold structure having an air vent.

An air vent forming in a mold, however, is very conventional in semiconductor art, especially in semiconductor molding art, for discharging air and gases in the cavity of the mold during formation of encapsulated injection (Kamiyama et al's Col. 6, lines 47+). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form an air vent in the metal mold structure of the proposed device of Haghiri-Tehrani et al. and Ueda et al. for air to escape during encapsulated injection, as taught by Kamiyama et al.

Allowable Subject Matter

9. Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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10. The following is an examiner's statement of reasons for allowance:

There was no prior art found by the examiner that suggested modification or combination with the cited prior art so as to satisfy the combination of the present claim 7; especially, the prior art does not provide a detail and structural interrelationship between an electroplated metal layer formed at part of a surface of the tape carrier and the injection port for seal resin injection, the part being brought into contact with the seal resin during formation of the resin seal, as recited by claim 7.


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is (703) 308-1211.

The examiner can normally be reached on 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Luan Thai
September 24, 2002


ALBERT W. PALADINI
PRIMARY EXAMINER